

NEW AND LITTLE-KNOWN SARCO- PHAGID FLIES FROM SOUTH- EASTERN QUEENSLAND.

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(Twenty-six Figures.)

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THE sheep maggot-fly problem in Eastern Australia has led to a considerable amount of attention being paid to certain blowflies, especially in New South Wales where Mr. W. W. Froggatt has been investigating them. However, apart from some references to a few species, e.g. *Sarcophaga aurifrons*, very little notice has been taken of the Sarcophagidae for many years past. In fact there is not an adequate account of even one of the flesh flies as yet recorded from the Commonwealth. Only two species from Australia have been figured, viz., *S. aurifrons* by Froggatt and *S. pachytilli* by Olliff. The family has, then, been almost entirely neglected, this inattention to such a common group of large blowflies being no doubt due to the difficulty experienced by collectors and workers in differentiating the various forms. Commonly Sarcophagid specific characters are far from being obvious, and as a rule it is necessary to study the male copulatory organs in order to differentiate between species which otherwise are very similar. It is extremely difficult to allot female specimens to their species as they much more closely resemble one another than do the males of different species. In order to obtain the two sexes we have bred out specimens from larvæ deposited by captured gravid females. As regards certain of those dealt with by us we have examined only males which were captured, and in such cases the female is still unknown.

The senior author, while on a recent visit to U.S.A. and England, took the opportunity to submit some Queensland Sarcophagids to Dr. J. M. Aldrich, of the National Museum, Washington D.C., and Major E. Austen, D.S.O., of the British Museum. To those two authorities on Diptera we are indebted

for certain identifications referred to later on. Dr. Aldrich also kindly allowed us to make use of the card catalogue of those recorded from Australia, the catalogue being the work of Dr. C. H. Townsend.

The first author to deal with any Australian Sarcophagidæ was Robineau-Desvoidy, who in 1830 published descriptions of five species from Sydney, viz., (1) *S. depressa*, (2) *S. peregrina*, (3) *S. subrotunda*, (4) *S. rapida*, and (5) *S. musca*, all under the generic name *Myophora*. We have not been able to consult his "Essai," but, thanks to Mr. W. A. Rainbow, Australian Museum, Sydney, we have seen figures of *S. musca* published by Guerin-Meneville, whose specimens came from New Guinea. The text relating to the work (Zoology, Voyage of the "Coquille") was not available, but Figure 4 suggests a *Sarcophaga*; the drawing of a front view of the head and face, however, shows marked differences from the *Sarcophaga* type, e.g. the sketch shows the presence of a fully plumose arista, prominent first antennal joint, an atypical number and arrangement of the bristles. If the figure be incorrectly drawn, then it is possible that *S. musca* may be that described later by Walker as *S. irrequieta*, since small underfed specimens of the latter commonly resemble *Musca domestica* at first sight in regard to size and colouration. In all probability the remaining four, if recognisable, will be found to be common forms in the vicinity of Sydney (*S. misera* being one for example), and some of the species described in this paper may be synonyms.

A little later Macquart (1846, 1855) described three from the east coast of Australia, viz., (6) *S. aurifrons*, (7) *S. flavi-femorata*, and (8) *S. ruficornis*. The last-mentioned specific name is not available, having been preoccupied by *S. ruficornis* (Fabr.) from East India. No. 7 we do not know. *S. aurifrons* is the name given in Australia to a certain type of blowfly, but as a result of our observations we find that probably ten or twelve Brisbane species could be included under the description. As we have not access to Macquart's type, we have fixed his name on a particular species based on specimens collected in Brisbane by Mr. Froggatt many years ago and forwarded to Washington D.C. for determination by Coquillet, who labelled some as *S. aurifrons* Macq. and others as *S. frontalis* Thoms. Through the kindness of Mr. Froggatt we have been able to examine the determined specimens.

Brauer and Bergenstamm (1891) used the name *S. aurifera* Macq. but we suspect it to be an error for *S. aurifrons*. At any rate it is a mere *nomen nudum* as used by these two authors.

Walker (1849) added the names of four species to the list, viz., (9) *S. impatiens*, (10) *S. misera*, (11) *S. irrequieta*, and (12) *S. prædatrix*. The type specimens of all four species are in the British Museum and are females labelled as having been collected in Sydney, New Holland, Houtman's Abrolhos (West Australia), and Port Essington (Northern Territory) respectively. We are now able to give full accounts of the first three of Walker's species, but the fourth is not represented in our collection.

Thomson in 1868 described two Sarcophagids collected by the "Eugenie" naturalists in Sydney, viz., (13) *S. ochripalpis* and (14) *S. pallichrus*. The former was stated to be near *S. aurata*, a species described by Macquart (locality, ? Oceania); but we have regarded it as a synonym of *S. irrequieta*. *S. pallichrus*, which Van der Wulp placed tentatively in his genus *Sarcophagula* (1887), is not represented in our collection.

There do not appear to be any more references to the group until 1891, when Olliff and Skuse named two parasites of grasshoppers as (15) *Tachina oedipoda* and (16) *Masicera pachytilli* respectively. Olliff referred to the latter and published a figure of it (1891a), the illustration being republished by Mackinnon (1920). The species was subsequently stated by Froggatt (1905, 1907) to be a *Sarcophaga*. *Tachina oedipoda* is a *nomen nudum* as far as Olliff (1891b) is concerned, but Froggatt (1905, 1907) has reported it to be a *Sarcophaga*, closely related to *S. aurifrons*. The status of these two flies bred from locusts can only be determined by an examination of the type material.

Certain specimens collected in Brisbane and forwarded by Mr. Froggatt (1907) to Coquillet for determination were reported to be (17) *S. frontalis*. Owing to Mr. Froggatt's kindness we have been able to synonymise Thomson's species with Walker's *S. misera*. Besides, the name *frontalis* is pre-occupied, having been employed by Doleschall in 1858.

Information relating to *S. aurifrons* was published by Mr. Froggatt in 1905, 1907, and in 1915.

The last Australian *Sarcophaga* to be described was (18) *S. froggatti* Taylor, 1917. Thanks to Mr. G. F. Hill, of the Australian Tropical Institute, we have been able to give an account of this fly.

Thus, of the eighteen species recorded to date, no less than eleven (including one with a preoccupied name) are still imperfectly known, many of them being quite unrecognisable from the scanty descriptions. Five are fully described (both sexes) in our paper, and two have been reduced to synonyms. To the list we add fifteen new and one previously known species, giving a description of both sexes in the case of eight new ones, and of the male only in the remaining seven.

We have compared our specimens with the accounts of various *Sarcophagæ* from New Guinea, Southern Asia, the East Indies, and the Pacific Islands, as given by Walker (1856-1865), Macquart, Thomson, and Parker. Unfortunately many of the descriptions published by Macquart and Walker are so general or so scanty as to be of very little value for comparative purposes. The following species, however, may be definitely excluded from synonymy with the species referred to in this paper:—*S. ruficornis* Fabr. (India and Philippines); *S. orientalis* Parker, *S. crinita* Parker, *S. harpax* Pand. (all from Philippines); *S. perpusilla* Walker (New Guinea); *S. robusta* Aldrich, *S. haemorrhoidalis* Fallen, *S. barbata* Thomson, *S. pallinervis* Thomson (all from Hawaii); and the following described by Walker from the East Indies: *S. aliena*, *S. indicata*, *S. invaria*, *S. mendax*, *S. inextricata*, and *S. brevis*.

Acknowledgments are gratefully made to Dr. Aldrich (U.S. National Museum), Major E. Austen (British Museum), Messrs. W. W. Froggatt (Government Entomologist, Sydney), H. Tryon (Government Entomologist, Brisbane), and G. F. Hill (Tropical Institute, Townsville, N.Q.), as well as Dr. T. L. and Miss M. J. Bancroft (Eidsvold, Q.), for assistance in regard to material; also Messrs. H. A. Longman, Director of the Queensland Museum, and W. A. Rainbow and A. Musgrave, of the Australian Museum, Sydney, for assistance in regard to literature.

Types, both holotypes and allotypes, will be deposited in the Queensland Museum, Brisbane. Paratypes will, if sufficient be available, be distributed to other museums such as the Australian Museum, Sydney, British Museum, and U.S. National Museum.

Although twenty-one species are described in this paper, all but one (*Helicobia australis*) fall within the limits of the genus *Sarcophaga* as ordinarily accepted. One species, *S. (Parasarcophaga) omega*, probably represents a new generic type but we have contented ourselves with the erection of a subgenus. Of the remaining nineteen species, the first four described—*S. impatiens*, *S. tryoni*, *S. alpha*, and *S. beta*—are very large flies with bright golden colouration on the head and thorax. The females, as far as known, possess scutellar apical bristles. Probably *S. gamma* belongs to this group but it is more greyish in general appearance. *S. delta* constitutes a group by itself; *S. irrequieta* and *S. eta* another small group of medium-sized greyish flies; *S. misera* and *S. dux* a fourth group. All the others, excepting perhaps *S. bancrofti*, are very similar in size and general colouration and constitute an *aurifrons* group.

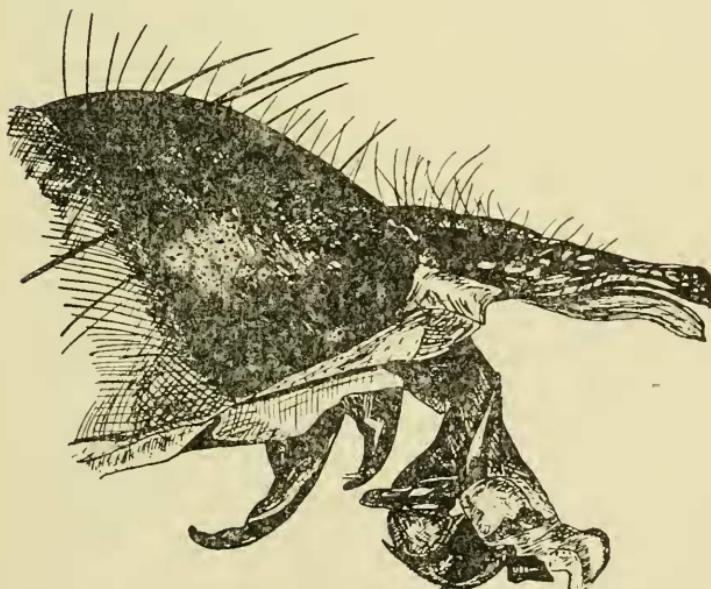
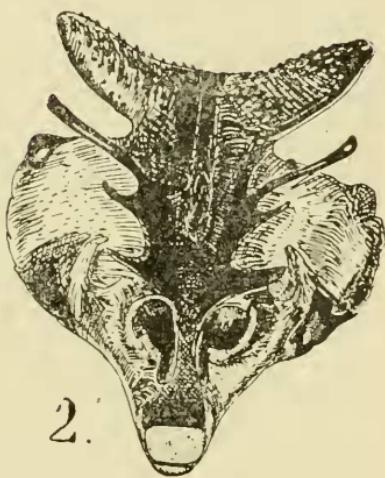
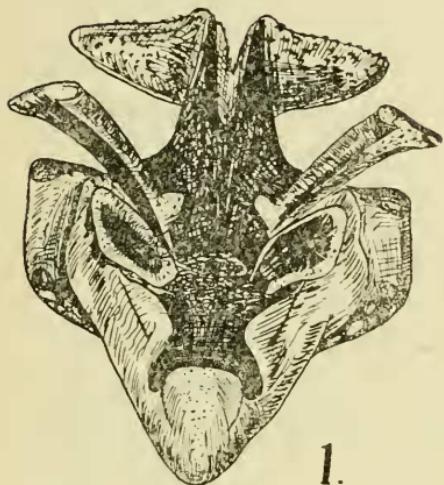
We have not attempted to describe any species of which only the female is represented in our collection.

1. *Helicobia australis* n. sp. (Fig. 24).

In general appearance a small rather slender grey fly, 5 mm. in length and only about 1·2 mm. in breadth.

MALE.—*Head*.—Front fairly prominent; at its narrowest about half the width of eye. Eyes red-brown. Parafrontals, cheeks, and back of head silvery, ferruginous in certain lights. Frontal stripe very dark chocolate, a little wider than parafrontals; mesofacial plates a pale fawn colour. First antennal joint inconspicuous; second large, very dark brown and with a silvery bloom; third less than twice the length of second, silvery. A row of eight frontals beside frontal stripe. Proboscis dark brown externally, much paler on internal (anterior) part; palps black; vibrissa inserted close to oral margin; four facials and three peristomials present. Verticals large, lateral verticals absent. Two rows of black bristles behind eyes, upper row the more complete. Silvery hairs clothe the back of the head, becoming longer but more sparse below; cheeks with black bristles.

Thorax as wide as head, and of a silvery grey colour. The usual three longitudinal lines are present, but are rather irregular and all extend on to scutellum, where the lateral ones are only faintly indicated. Thorax deep grey laterally and ventrally. Anterior spiracle very small, clothed with brown hairs.



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The last two pairs of anterior acrostichals feebly developed; prescutellar acrostichals moderately strong. Apical scutellars present. Dorsocentrals remarkably well developed; the last two pairs as usual much the largest, the more anterior ones considerably larger than the prescutellar acrostichals. Two intra-alars present; three humerals; two post-humerals, of which the anterior is the larger.

Wings.—In the wing the first longitudinal vein is hairy, thus placing the species in the genus *Helicobia*.

Legs black; first femur not hairy, tibia shorter than tarsus; second and third legs not hairy, second femur without "comb," tarsus longer than tibia; third tibia about as long as tarsus.

Abdomen about as long as thorax, oval; covered with short reclinate bristles above, slightly hairy below; provided postero-ventrally with a few rather long bristles. First segment of hypopygium greyish; second segment very dark shiny brown, hairy, tipped dorsally with light brown. Forceps relatively very large, shiny black, sharply pointed, and exceedingly hairy. Accessory plate somewhat semicircular, hairy. Penis fairly heavily chitinised, bearing posteriorly two long, prominent, ventrally directed processes, as figured (Fig. 24).

Described from two males, bred from decaying meat in Brisbane. *H. australis* is the first representative of the genus to be recorded from Australasia.

2. *Sarcophaga impatiens* Walker 1849 (Figs. 18, 19).

In general appearance a large golden and black fly, the male measuring about 14 mm.; the female somewhat shorter, about 12 mm. long, and much more thick-set.

MALE.—*Head*.—A little narrower than widest part of thorax. Front not very prominent; about three-fifths the width of eyes. Frontal stripe very dark chocolate brown. Mesofacial plates a rich golden colour, borders tinged with black. Parafrontals golden, with dark reflections; cheeks bright golden. Eyes red-brown. Proboscis black and brown, with golden hairs; palps black. Back of head golden, with a single row of short black bristles behind eyes. Hairs below these golden, becoming very long and bright golden on cheeks.

First antennal joint very small; second large and very dark brown, third over thrice the length of second, dark

ferruginous. The second joint bears a prominent bristle. A row of thirteen frontal bristles present. Vibrissæ inserted well above oral margin. Seven facial and five long peristomial bristles present. Lateral verticals inconspicuous.

Thorax golden, with the usual three longitudinal stripes, the middle one alone extending on to scutellum. Sides and ventral surface of thorax golden. Anterior acrostichals present, but very feebly developed. Of the posterior acrostichals only the prescutellar represented; these are moderately strong. Row of dorsocentrals complete; last in row very large. Scutellar apicals present. Anterior intra-alar bristle about as large as prescutellar acrostichal. Humeral bristle large but not extending beyond pronotum. Anterior spiracle dark chocolate coloured, protected by a heavy growth of short golden hairs.

Legs black and grey. First femur tinged with gold; hairy. Second femur hairy, but not heavily so: last tibia hairy. Pulvilli dark brown, fringed with silvery hairs.

Abdomen in male a little longer than thorax, conical; silvery with the usual black and silvery markings, and frequently tinged with gold. Median dorsal black stripe not extending on to last segment. Abdomen hairy beneath. First segment of hypopygium brown, anterior portion almost greyish; second, dark shining brown, almost black, the whole provided with long curly black hairs. Forceps angular and fairly sharp-pointed, the upper half provided with a number of short anteriorly directed bristles, and with long black hairs. Accessory plates dark brown, hairy. Claspers dark brown, almost black; the anterior pair especially strong, due to a great thickening of the lower two-thirds. First joint of penis dark brown; second dark brown, black in parts, bordered with white antero-ventrally, and provided with hooks and chitinous processes, as figured (Fig. 19).

FEMALE.—This differs from the male in the following important characters:—Front slightly more prominent than in male; about five-sixths the width of eyes. Eleven frontal bristles beside the frontal stripe, and three beside eye; these latter extremely large, even more so than in *S. tryoni*; practically only in this respect can the two females be distinguished. Lateral verticals very large. Scutellar apical bristles present, but small and fairly close together. First femur clothed with short hairs ventrally; longitudinal row of bristles very well

developed. Second femur hairless; a "comb" not differentiated. Neither last femur nor tibia hairy. Abdomen oval, shorter and broader than thorax.

Bred from bad meat. This species is very common around Brisbane, especially during early autumn.

A female was kindly identified for us by Mr. E. E. Austen of the British Museum, by comparison with Walker's type (a female) in that collection, described from New Holland. A comparison of our bred females with this form allowed us to determine the hitherto undescribed male. Walker's type is labelled as having come from Sydney. Others in the British Museum have been collected in Tasmania, South Queensland, North Queensland (Stannary Hills, Coll. Dr. Baneroff), and New Hebrides; all determined by Mr. Austen.

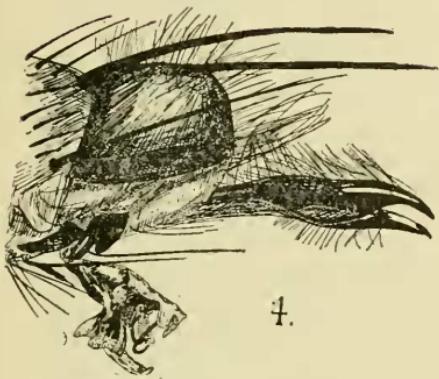
3. *Sarcophaga tryoni* n. sp. (Figs. 9, 10).

Syn. : *S. frontalis* (in part) of Australian authors.

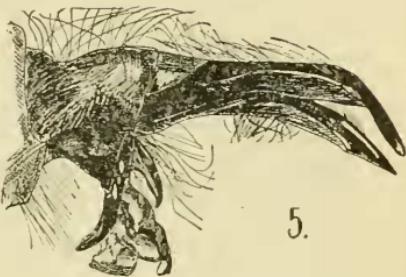
In general appearance bright gold and black. A large *Sarcophaga*, the males measuring about 17 mm. in length, though some may be as small as 11 mm. Female considerably shorter, measuring about 12 or 13 mm.

MALE.—*Head*.—Parafrontals bright gold, with dark reflections. Back of head and cheeks bright gold. Width of front about half that of eyes. Frontal stripe black, about as wide as parafrontals. Mesofacial plate very pale golden, borders tinged with black. First antennal joint very small, dark brown; second much larger, almost black; third joint nearly four times the length of second, ferruginous. A row of eleven frontal bristles present. Verticals large, lateral verticals very small. Epistome prominent, tinged with pink; proboscis black, with golden hairs. Vibrissæ large. About seven small facial bristles present; twelve peristomials. One row of black bristles behind eyes; back of head provided with short golden hairs, forming a beard-like growth on cheeks.

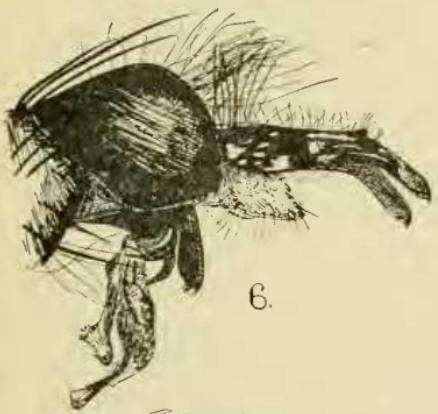
Thorax varying from bright gold to almost ashy colour, and with the usual three black longitudinal stripes, the middle one alone extending on to scutellum. Sides of thorax grey, tinged with gold. Anterior spiracle with a strong growth of short golden and silvery hairs.



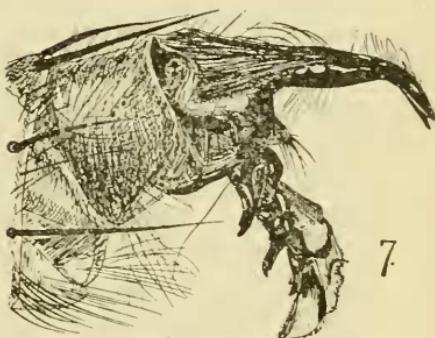
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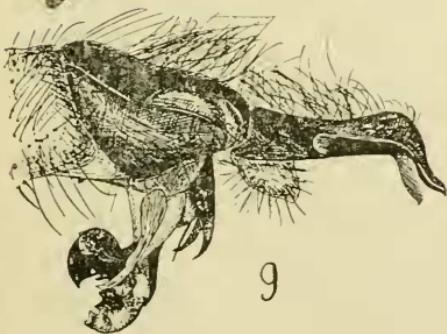
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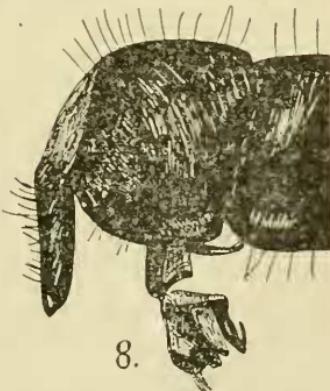
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Anterior acrostichals present, but only posterior pair well developed. Presutellar acrostichals extend almost to end of scutellum. Dorsocentrals complete; posterior pair extending just beyond scutellum. Three humerals, the lowest reaching about three-quarters of the distance to mesonotum. Anterior intra-alars extremely weak. Scutellar apicals present.

Legs black and grey. Anterior femora tinged with gold. Rows of bristles complete, but not hairy. Second femur with short growth of hairs proximo-ventrally; "comb" developed. Third femur with beard-like growth of hairs; third tibia very hairy. Pulvilli dark brown, with silvery borders.

Abdomen a little broader than thorax. Silvery, with very faint gold reflections; the usual black markings present. The longitudinal black line hardly visible on last segment. Dorsal surface with short black reclinate bristles; ventral side hairy, especially posteriorly. Hypopygium fairly prominent, dark brown, almost black, very hairy. Accessory plate brown, hairy. Forceps dark brown; not smooth; angular; upper part hairy; ventral portion bare; tip not very sharp. Claspers reddish brown. Distal joint of penis divided into anterior and posterior parts, the colour of different portions varying from white to black, according to the degree of chitinisation; the posterior division provided with four short sharp spines (Figs. 9, 10).

FEMALE.—This differs from the male in the following important characters:—It has the shorter, more thick-set appearance typical of females. Colouration identical. Front at narrowest point as wide as eye. Third antennal joint scarcely three times the length of second. Arista slightly more plumose than in male. Frontal stripe a little narrower than parafrontals. Ten bristles in inner frontal row; three very large ones comprising the outer frontal row; the lowest reaching not quite to the base of the antenna. Lateral verticals absent. Thoracic chaetotaxy as in male. Scutellar apicals present, but a little closer together than in male, and situated, not lateral to, but behind, the scutellar extension of the median longitudinal black stripe. Anterior femur very faintly hairy. Second femur not hairy, no "comb" developed. Third femur and tibia without hair. Abdomen a little shorter than thorax; oval. Longitudinal black stripe definite on last segment.

Bred from bad meat. This species, with which we have much pleasure in associating the name of Mr. Henry Tryon,

the veteran Queensland Entomologist, is common around Brisbane, especially in March.

S. tryoni is without doubt one of the several species formerly included by Australian entomologists under the name of *S. frontalis*.

4. *Sarcophaga alpha* n. sp. (Fig. 21).

In general appearance a large brilliant gold-and-black insect, the male measuring about 15 mm. in length.

MALE.—*Head*.—Parafrontals bright gold, with dark reflections. Cheeks and back of head bright gold. Frontal stripe almost black; a little wider than the parafrontals. Front rather projecting and about three-quarters the width of the eyes. Eyes reddish brown. First antennal joint small; second much larger, black; third about three times the length of second, ferruginous, and with a silvery bloom. Arista about half as long again as antenna, very strongly plumose. Mesofacial plates golden, bordered with black. Proboscis black, with pale-gold hairs; palps black. Epistome prominent.

A row of eleven frontal bristles present; vibrissæ inserted somewhat above the oral margin. Five large and numerous smaller facial bristles; thirteen large epistomials. Verticals very large; lateral verticals medium-sized. A single row of black bristles behind eyes. Back of head provided with golden hairs, which become very long on cheeks.

Thorax golden, with three longitudinal black lines, of which the middle one extends on to the scutellum. Sides of thorax golden, with black markings; ventral side grey. Anterior spiracle black, with a few golden hairs.

Anterior acrostichals present, but small. Of the posterior acrostichals only the prescutellar occur. Dorsocentrals present; last two larger; last very large. First humeral bristle as large as first dorsocentral; last humeral not extending to the mesonotum. Scutellar apicals present.

Legs black, tinged with grey. Femur of first leg tinged with gold; dorsal and ventral longitudinal rows of bristles very well developed; very hairy. Second femur hairy on the proximal ventral side, but not markedly so; “comb” differentiated. Third femur very hairy. Third tibia very hairy; second hairy on ventral distal portion; first not hairy. Third tarsus a little longer than tibia. Pulvilli very dark brown, borders silvery.

Abdomen about as broad as thorax but considerably longer, measuring 8 mm. ; pale golden, with the usual black markings. The dorsal black line complete. Dorsal surface covered with very short black reclinate bristles. Ventral surface slightly hairy, especially on last segment. Hypopygium large, shiny black, hairy. Forceps shiny black, and very definitely angular ; lower arm of the angle bare, upper arm hairy ; at the angle a number of short hairs and short blunt bristles. Accessory plate very dark brown, hairy. The posterior clasper is remarkable, in that it is provided with three prongs.

The penis closely resembles that of *S. crinita* from the Philippines, described and figured by Parker (1917). The upper joint is very dark brown, in places shining black. The lower is heavily chitinised on its proximal side, and from this are given off two anteriorly projecting curved shiny black hooks, supported dorsally and ventrally by a pair of large, but not heavily chitinised, "sheaths" (Fig. 21).

Described from two males caught around bad meat in Brisbane.

5. *Sarcophaga beta* n. sp. (Fig. 6).

In general appearance a large golden insect ; smaller specimens not unlike *S. aurifrons* Meq. Length 11 to 14 mm.

MALE.—*Head*.—Front slightly prominent, about half the width of eyes. Eyes dark red-brown, rather flat in front. Frontal stripe nearly black, as wide as parafrontals. Parafrontals, genæ, and occiput bright golden. Mesofacial plates golden, borders tinged with silver. First antennal joint inconspicuous, second large and very dark ferruginous, third less than thrice the length of second and of a deep fawn colour. Epistome not very conspicuous. Vibrissæ large, inserted well above oral margin ; seven facials present, eight peristomials ; thirteen pairs of frontals beside frontal stripe ; verticals fairly large, lateral verticals absent. A single row of black bristles behind eyes ; occiput covered with weak golden hairs, which form a bright-gold beard-like growth on the posterior parts of the genæ ; anterior part of genæ with shorter bright-golden hairs. Proboscis typical.

Thorax golden, with the usual black stripe, the median one alone extending on to scutellum ; sides golden ; under

side greyish. Three humerals present; the last two pairs of anterior aerostichals feebly represented. Of the posterior set, only the prescutellars are developed. Dorsocentral row complete; two intra-alars present. Anterior spiraele with light-brown hair.

Legs black and grey. First femur hairy; the longitudinal rows of bristles very completely developed; tibia longer than tarsus. Second femur hairy proximo-ventrally; a "comb" differentiated; tibia extremely hairy. Third femur very hairy; tibia moderately so.

Abdomen with usual black and white markings, the median black line extending faintly on to last segment. Covered above with short reclinate bristles, below rather hairy.

First segment of hypopygium brown, slightly pollinose; second shiny, almost black, hairy. Forceps shiny black, sculptured externally; approximated for about two-fifths their length, sharply pointed, angular in lateral view, the upper arm only being hairy. Accessory plates somewhat oval in shape, dark brown, with long hairs. Claspers very dark brown; posterior clasper very broad; the anterior clasper with two strong processes. The anterior part of the membrane surrounding the base of the penis also develops a short, blunt, yellowish process. Distal joint of penis fairly heavily chitinised. It is of the *S. crinita* type, as figured by Parker (1917), and consists of a posterior sheath, which lodges the base of a pair of strong processes, serrated anteriorly, and tipped with white. Anterior to the sheath is a movable hook-like structure, bearing in front a strongly serrated membrane, greyish in colour. The whole copulatory organ very closely resembles that of *S. delta*.

FEMALE.—This differs from the male in the following characters:—Eyes rather flat in front, giving the front a rather prominent appearance. Front about three-fifths the eye-width. A row of nine frontals beside frontal stripe, and three larger ones immediately beside eyes. Lateral verticals present and well developed. Thoracic chaetotaxy as in male, except that apical scutellars are rather weaker. First femur moderately hairy, tibia slightly longer than tarsus. Second and third femora and tibiæ hairless. No "comb" on second femur.

Described from two males and two females bred from decaying meat in Brisbane, February 1921.

6. *Sarcophaga gamma* n. sp. (Fig. 15). •

In general appearance a medium-sized fly, about 13 mm. in length, and of a faintly golden greyish colour.

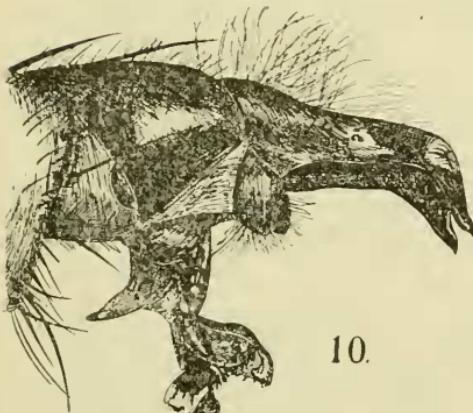
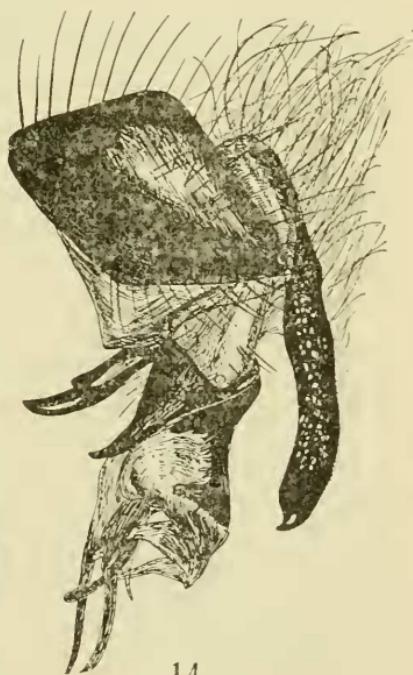
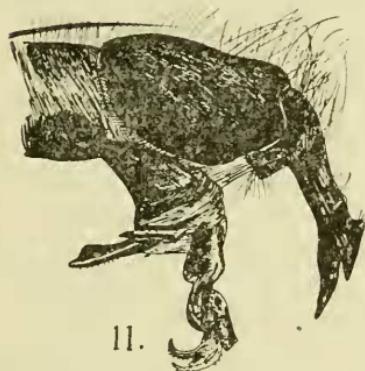
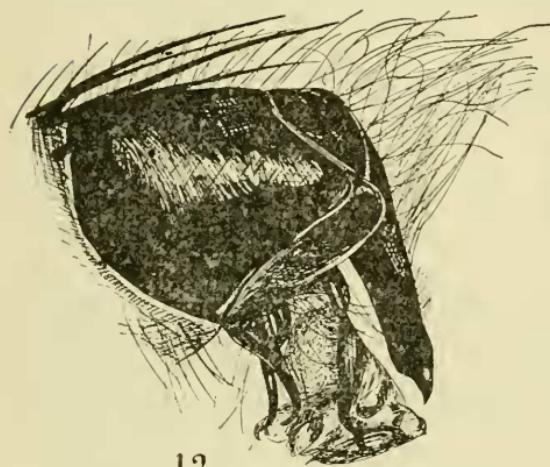
MALE.—*Head*.—Front not very prominent; about three-quarters the width of the eye. Frontal stripe very dark chocolate brown, nearly black; almost twice the width of the parafrontals at their narrowest point. Parafrontals, genæ, and oeciput bright golden. First antennal segment more conspicuous than usual; second large, very dark brown; third a dark fawn colour and about twice the length of second. Frontal field pale golden, borders dark; epistome not prominent. Proboscis and palps as usual. Eyes dark red-brown. Nine frontals. Verticals moderately developed; lateral verticals small. Vibrissæ inserted well above the oral margin. Four facials and twelve peristomials present. A single row of short black bristles behind eyes; hairs below this short and golden, becoming longer below on the genæ; those on anterior part of genæ shorter.

Thorax grey, tinged with gold. The usual three black lines present; the median extending on to scutellum where the laterals are only indistinctly represented. Under side grey; sides grey, tinged with gold. Of the acrostichals only the prescutellar are present, and these are but very faintly developed. Dorsocentral row complete. Apical scutellars present; anterior intra-alars exceedingly weak. Anterior spiracle with pale-golden hairs.

Legs grey and black. First femur with just a tinge of gold, slightly hairy; longitudinal rows of bristles very complete. Second femur hairy proximo-ventrally, with a well-defined "comb" distally; tibia longer than tarsus. Third femur hairy; tibia heavily clad with short hairs.

Abdomen covered dorsally with short reclinate bristles; hairy beneath. Conical in general shape, and a little longer than thorax. With the usual black and white markings; the dorsal black line extending on to last segment.

First segment of hypopygium silvery; second half the length of first, nearly black and shiny, hairy. Accessory plates triangular, brown, hairy. Foreeps very well developed, shiny black, approximated for over half their length; tips bare, remainder very hairy. Claspers simple; dark shining black. First joint of penis very dark brown; second dark



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brown and shiny black, in places white. The distal portion is divided into two parts, of curious appearance, as figured (Fig. 15).

Described from two males captured around 'decaying meat in Brisbane, April 1921.

7. *Sarcophaga delta* n. sp. (Fig. 13).

In general appearance a large grey fly, about 15 mm. in length.

MALE.—*Head*.—Front slightly prominent, about two-fifths the width of eye. Frontal stripe very dark chocolate, rather narrower than parafrontals, which are pale golden, and rather more heavily pollinose than usual; genæ rather brighter golden; occiput silvery with pale-golden tint. Mesofacial plates silvery, with somewhat darker borders; ptilinal suture fairly distinct throughout life. First antennal joint rather more prominent than usual; second large and nearly black; third a fawn colour, and about thrice the length of the second. A row of ten frontals beside frontal stripe; eight facials, and fourteen peristomials, some of the latter exceedingly large. Verticals present; lateral verticals present, but very weak. A single row of black bristles behind eyes. Back of head heavily clad with pale-golden hairs, developing into a beard-like growth postero-ventrally, and much shorter on the anterior part of the genæ. Proboscis as usual, palps black.

Thorax.—This is of a deep grey, with the usual black longitudinal marks, the middle one alone extending on to scutellum. Lateral and vertical parts grey. Anterior spiracle heavily coated with short brown hairs. Shoulder armed with moderately long black bristles. Anterior acrostichals all present, though very weak, posterior pair rather stronger than the others. Of the posterior row, only the prescutellars are present; these are very strongly developed. Apical scutellars very long. Dorsocentral row complete. There is an indication of a third intra-alar.

Legs black and grey. First femur slightly hairy, tibia longer than tarsus. Second femur slightly hairy proximo-ventrally, a "comb" differentiated; tibia hairy. Third tibia hairy; of a dark-brown colour.

Abdomen a deep grey with the median longitudinal deep-brown line feebly developed, and not distinctly visible on

last segment. Segments very faintly tinged with deep brown. Covered dorsally with short, black, reclinate bristles; slightly hairy ventrally, on all except last segment, which is very hairy.

First segment of hypopygium pale brown anteriorly, nearly black posteriorly, hairy; second segment shiny black and only very lightly hairy. Forceps very long, deep brown above, black below and slightly angular; not very sharply pointed. "Angle" armed with short black bristles; claspers dark shiny brown; the anterior clasper with two prongs. The penis shows a remarkable resemblance to that of *Sarcophaga beta*, which is in every other respect a quite distinct fly. The large anterior "hook" is present, but rather more slender; the pair of ventrally directed prongs also present, but not serrated anteriorly.

Described from one male captured by Mr. H. Jarvis on flowers in Brisbane, and kindly donated by Mr. Tryon.

8. *Sarcophaga irrequieta* Walker 1849 (Figs. 1, 2, 3).

Syns. : *S. ochripalpis* Thomson 1868.

S. frontalis Johnston and Bancroft 1920.

In general appearance an ashy coloured fly, about 11 to 12 mm. long, though at times much smaller (7 mm.).

MALE.—*Head*.—Parafrontals silvery with dark reflections, and very faintly tinged with gold. Front at narrowest part about one-fifth the width of head. Frontal stripe almost black, one and a-half times the width of parafrontals. Mesofacials faintly golden in the middle, more silvery at sides. First antennal joint small; second large and black; third over thrice the length of second, ferruginous, with faint silvery bloom. Arista plumose for over half its length and considerably longer than the three antennal joints combined. Eyes dark red-brown, the anterior facets larger than the posterior. Back of head dark grey, faintly tinged with gold immediately behind the eyes; cheeks lighter grey, gradually merging into the colour of the parafrontals. Proboscis dark brown, almost black, clothed with long golden hairs. Palps varying from ferruginous to almost black. Vibrissæ long, inserted close to the oral margin. About ten moderately large facial bristles present. About ten rather long epistomials. Cheeks covered with short black bristles. A single row of twelve frontal

bristles. Lateral verticals very small. Three rows of black bristles behind eyes. Hairs, behind these, short and golden. Genæ provided with very long silvery hairs.

Thorax grey, faintly tinged with gold, especially around sides; frequently the thorax is quite grey. Three fairly regular longitudinal stripes present, of which the middle one alone extends on to the scutellum. Anterior spiracles dark chocolate in colour, covered with short silvery hairs. Ventral side of thorax greyish, provided with short black bristles; median ventral plates pink. Three humeral bristles present, of which the lowest two are rather large, and much larger than the first. Of the acrostichals, only the prescutellar pair is present. Anterior dorsocentrals rather weak. First posterior dorsocentral very weak; second a little larger, third much larger, fourth extending well beyond scutellum. First intralar very small, second very large. Apical scutellar bristles present.

Legs.—Coxæ dark grey, well armed with bristles. Femora black and grey, often faintly tinged with gold. First femur slightly hairy on its proximal ventral side; second femur more hairy, median ventral bristles differentiated into a "comb"; third femur hairy on median ventral side. Pulvilli dark brown, fringed with very minute silvery hairs.

Abdomen greyish gold in appearance, with the ordinary black markings. Upper surface covered with short reclinate bristles; ventral side hairy.

Hypopygium shining black, hairy, and not visible from above. Forceps shiny black, sculptured, dark brown on inner surface. Accessory plates brown, hairy, but not markedly so. Claspers heavily chitinised, shiny black.

The first joint of the penis is dark brown; the second forms a highly chitinised structure almost uniformly black. Viewed ventrally (Figs. 1, 2) it is triangular in shape, the apex of triangle pointing backwards. The organ is provided with two pairs of downwardly, outwardly, and ventrally projecting pale-brown chitinous processes, and with a pair of very heavily chitinised triangular, somewhat rounded masses, highly serrated on their anterior surface, giving the whole organ a remarkable appearance in lateral view (Fig. 3). In ventral view there can be seen two pale-yellow inwardly projecting chitinous pieces given off from the more anterior part of the triangle.

FEMALE.—This differs from the male in the following characters:—Front less than one-third width of head. A row of eleven frontals beside the frontal stripe, three others immediately beside the eye, and converging above on to the first row. Lateral verticals nearly as large as verticals. Scutellar apicals absent. Legs not hairy. Anterior femur with very complete ventral row of bristles; only slightly hairy. In the second femur, the median ventral row is poorly developed; no “comb” is differentiated. Third femur not hairy. Pulvilli in the form of short tubes. Abdomen a little longer than thorax; oval. Sometimes grey, at other times distinctly golden. Ordinary black markings present. A black stripe, sometimes very distinct, runs down the middle of the abdomen. Dorsal surface with small reclinate bristles; ventral surface hairy, especially posteriorly.

This species appears to be identical with *S. ochripalpis* Thomson 1868, originally described from Sydney. We have suggested that *S. irrequieta* may perhaps be synonymous with *S. musca* described many years earlier by Robineau-Desvoidy (1830). Walker's type specimen, a female, came from the Houtman's Abrolhos, off the coast of West Australia. Our material was bred from decaying meat in Brisbane.

9. *Sarcophaga eta* n. sp. (Fig. 14).

In general appearance a medium-sized fly, about 11 mm. in length and closely resembling *S. irrequieta* Walker.

MALE.—*Head.*—Front a little prominent, about half the width of eyes. Frontal stripe very dark brown, a little wider than parafrontals. The latter silvery, tinged faintly with gold; cheeks a little paler. Rear of head faintly golden, almost silvery. Mesofacial plates silvery, tinged with gold; borders blackish. Eyes red-brown. First antennal joint longer than usual, easily visible; second more slender and longer than usual, nearly black; third joint less than twice length of second. Arista plumose but not very strongly so. Proboscis dark brown; palps very dark ferruginous, almost black. The ptilinal suture remains very distinct throughout life. A row of nine frontals beside the frontal stripe. Vibrissæ inserted just above oral margin. Five rather small facials present; peristomials eight in number, not very large. Cheeks provided with small black bristles. Two rows of black bristles behind eyes, the upper the more complete. Back of head covered

with short silvery hairs, which become longer on cheeks, but do not develop into a strong beard-like growth. Vertical bristle large ; lateral vertical very small.

Thorax grey, with three longitudinal black lines, of which the middle one alone extends on to scutellum. Tip of scutellum faintly golden. Lateral and vertical parts of thorax grey. Of the acrostichals, only the prescutellar pair is present. Dorsocentrals complete, the last pair just extending beyond scutellum. Three well-developed humerals present. Apical scutellar bristle present. Anterior spiracle dark chocolate colour, with brown hairs.

Legs black and grey. First femur slightly hairy proximally ; ventral longitudinal row of bristles very complete ; first tarsus not longer than tibia. Second femur slightly hairy on proximal ventral half, "comb" developed ; second tibia hairy ; tarsus a little longer than tibia. Third tibia hairy ; tarsus nearly as long as tibia. Pulvilli brown, fringed with delicate silver hairs.

Abdomen a little longer than thorax, with the usual black and silvery markings, the middle black line not definite on last segment. Short black reclinate bristles above, hairy beneath. Hypopygium almost black, shiny, very hairy. Forceps fairly straight, provided with a heavy growth of short hairs on its upper half. Posterior connecting membrane very feebly developed, though the forceps are approximated for about two-thirds their length. Accessory plates triangular, very dark brown, hairy ; claspers shiny black. The penis is probably to be regarded as of a much modified *tuberosa* type ; the posterior ventral spine being present and the anteriorly projecting chitinous bars represented by a pair of somewhat slender, curved, non-bifurcated pieces of chitin. Foliaceous chitin masses resembling those of *S. misera* var. *dux* are present, but are produced ventrally each into a long brown chitinous process.

FEMALE.—This differs from the male in the following important characters :—Front slightly wider than eyes ; an inner row of nine frontal bristles present, an outer of three, of which the lowest is very large. Scutellum more abbreviated than in male. Thoracic chaetotaxy as in male, except that last pair of posterior dorsocentrals extend well beyond scutellum. Scutellar apicals absent.

Legs.—First femur not hairy; second and third femora and tibiæ devoid of hair, no “comb” on second femur. Abdomen shorter than in male, oval; the middle black line extending on to last segment.

Described from specimens bred by Mr. Henry Tryon from fish; in Brisbane. We have also collected one male attracted to bad meat in Brisbane.

10. *Sarcophaga misera* Walker 1849 (Fig. 22).

Syns. : *S. frontalis* Thomson 1868.

S. frontalis (in part) Froggatt 1907.

S. frontalis Tryon 1917.

S. misera Cleland 1912, 1913.

S. misera Johnston and Bancroft 1920 (*a* and *b*).

A moderate-sized fly, approximately 12 mm. in length, though some specimens may be as small as 7 mm.

MALE.—*Head.*—Parafrontals pale golden, somewhat darkly tinged. Breadth of front at narrowest point about one-fifth width of head; cheek height one third that of eye. Eyes dark red-brown. Frontal stripe dark brown, almost black. First antennal segment inconspicuous; second large and black; third black, tinged with grey, and about twice the length of the second. Arista plumose for over half its length. One row of black chaetæ behind eyes. Bristles below these irregular, dark, merging into longer golden hairs on genæ. Anterior part of cheek provided with long black chaetæ. First segment of proboscis black, tinged with silver and pink; second segment shiny black; hairs of proboscis dark golden. Palps varying from brown to almost black. Lateral verticals absent. Vibrissæ inserted just above the oral margin. A single row of ten frontal bristles present, reaching down below the insertion of antenna.

Thorax greyish, tinged with gold; sometimes rather bright gold in appearance. Three dark irregular longitudinal stripes, extending on to the scutellum. Thorax at wing insertion pinkish. Bristles on thorax rather short, reclinate. Three humeral bristles present, of which the lowest is the longest. Anterior acrostichals absent. Three anterior dorso-centrals present, but very short. Outer presutural very large.

inner very weak. Four posterior dorsocentrals, first short, second a little longer, third much longer, fourth extending well beyond scutellum. Scutellar apical present. Three (at times five) sternopleurals. Ventral side of thorax silvery, sometimes tinged strongly with gold. Clothed with short black bristles, but not thickly.

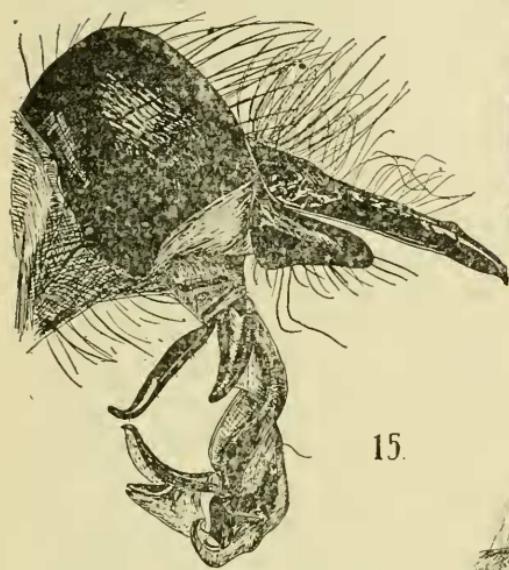
Legs black, tinged with grey. Second and third coxae tinged with silver and pink. Coxæ strongly armed with reclinate bristles. Proximal end of first femur with a small number of rather short hairs; second femur provided on its lower proximal half with a beard-like growth of very long hairs, while extending from the hairs to the top of the femur on its posterior part is a row of short stout bristles, about ten in number, forming a "comb." Tarsi not shorter than tibiæ; pulvilli large, black, fringed with minute white hairs.

Abdomen black and silvery, clothed above with short reclinate bristles, beneath with longer hairs. Second segment without marginals; third with two; complete row on fourth.

Hypopygium black, not very prominent. Forceps black. Hypopygium and upper part of forceps provided with long curly hairs, which gradually shorten on the forceps; the tip of the latter bare. Prongs of forceps connected for varying distances by membrane. Copulatory organs of *tuberosa* type. Claspers dark brown. Accessory plates almost black, hairy. First joint of pénis black, heavily chitinised; second joint somewhat triangular, the posterior end produced into a short sharp point, and bearing two large forwardly projecting prongs slightly bifurcated anteriorly; the whole dark brown, except in the most heavily chitinised parts, which are black. Between the anteriorly projecting chitinous pieces is a pair of pale-yellow serrated chitinous processes. The anterior portion of the penis is whitish.

FEMALE.—The female is usually a little larger than the male, especially, of course, in the abdominal region.

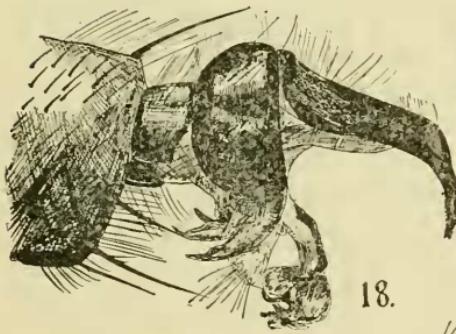
Front about one-third the width of head. Frontal bristles in two rows; one beside the eye, consisting of four bristles; the other situated along the frontal stripe and composed of ten bristles. Scutellar apicals absent. Anterior femur slightly hairy, others not so; the ventral row of bristles of the second femur complete, i.e. no "comb" is differentiated. Third coxa bears a short apical bristle.



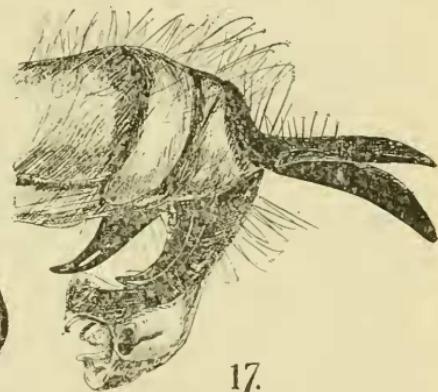
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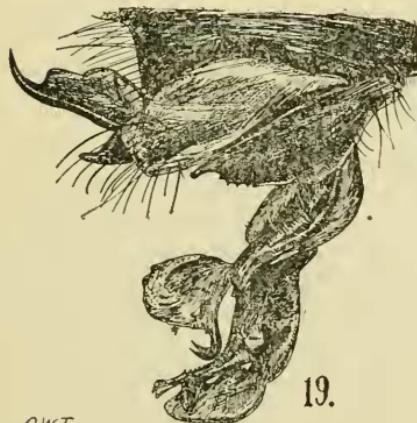
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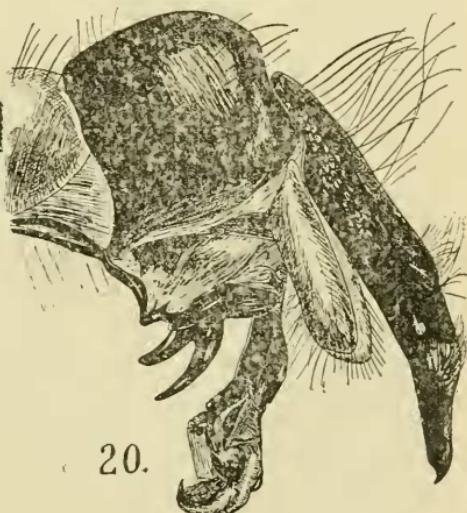
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Abdomen oval; genital segments are not visible from above. First ventral plate short but wide, second longer but narrower and bearing ten bristles, third still narrower with four bristles, fourth very narrow, fifth and sixth very narrow and fused.

Our specimens were bred from bad meat in Brisbane and horsedung in Eidsvold.

This species was first described by Walker (1849, p. 829), the type in the British Museum being a female from "New Holland." That institution also has specimens sent by Dr. Bancroft from the Burnett River. Mr. E. E. Austen, of the British Museum, has identified for us, by comparison with Walker's type, some females which are co-specific with other females common in Brisbane, while males have been obtained by breeding.

Mr. W. W. Froggatt, of Sydney, has kindly allowed us to examine a specimen collected at North Pine, near Brisbane, originally determined for him by Coquillet as *S. frontalis*,¹ and referred to by him under this name (Froggatt, 1907, p. 315). It has been found specifically identical with *S. misera*. Johnston and Bancroft (1920, p. 75) have already referred to the presence of this species (Burnett River and Brisbane), while Cleland (1912, p. 150; 1913, p. 567) reported its occurrence in Sydney and Adelaide. Walker in his original description mentioned its presence in West Australia. Mr. Tryon (1917, p. 53) has referred to *S. frontalis* as one of the Queensland sheep maggot-flies. It seems to occur, then, over the whole of Australia.

11. *S. misera* Walker var. *dux* Thomson 1868 (Fig. 23).

Syns. : *S. dux* Thomson 1868.

S. frontalis (in part) Froggatt 1907.

S. subtuberosa Parker 1917.

Among the male *Sarcophagas* captured around carrion in Brisbane are a few which are in every way identical with the males of *S. misera* except for small differences in the structure of the penis. In these forms the anteriorly projecting bifurcated chitinous bars at the termination of the organ are considerably shorter and stouter, whereas the chitinous mass above these is much weaker, and even foliaceous in appearance

¹ Thomson's specific name was already preoccupied, *S. frontalis* having been given to a fly from Amboina by Doleschall in 1858.

(Fig. 23). One of these males was submitted to Dr. J. M. Aldrich of the United States National Museum, who determined it as *S. dux* Thomson. These males cannot be distinguished from *S. subtuberosa*, described from the Philippines and Guam by Parker (1917). In a note to Dr. E. W. Ferguson of the Health Department, Sydney, Dr. Parker referred to the latter species as being synonymous with *S. dux* Thomson. A female specimen of *S. dux* from Honolulu, kindly lent us by Mr. Henry Tryon, is indistinguishable from females determined by E. E. Austen as *S. misera*. These forms agree so closely with Walker's species that the differences are sufficiently recognised by placing the flies under the name *S. misera* var. *dux*.

The distribution of this variety is very wide. Thomson described his material from Honolulu, where its presence has also been referred to by Grimshaw and by Timberlake (1917). Parker's specimens came from the Philippines and Guam; ours were captured in Brisbane. This variety is one which has no doubt been included under *S. frontalis* by Australian authors, and is probably common in New South Wales.

12. *Sarcophaga aurifrons* Macquart 1846 (*nec* Doleschall 1858) (Fig. 4).

Syns.: *S. aurifera* Brauer and Bergenstamm.

S. aurifrons Foggatt 1905, 1907, 1915.

S. aurifrons Tryon 1917.

S. aurifrons Johnston and Baneroff 1920.

S. aurifrons Mackinnon 1920.

In general appearance a medium-sized greyish golden fly, about 10 mm. in length.

MALE.—There is considerable variation in the shape of the head. In some specimens the eyes are either flat in front or (sometimes) slightly bent inwards giving the small frons a very prominent appearance. In each form the frons at its narrowest point is about one-third the width of eyes; while the frontal stripe is wide below, then becoming exceedingly narrow (less than half the width of parafrontals), widening again in the region of the ocelli. In other specimens the eyes are more projecting, the front proportionally less prominent, and the frontal stripe about two-thirds the width of an eye. The two types may occur among forms bred from the same parent. Eyes very dark red-brown. Parafrontals bright

golden, with dark reflections ; genæ paler gold provided with black bristles. Occiput bright golden. Mesofacial plates very pale gold, almost silvery, with dark borders.

First antennal segment moderately conspicuous, black ; second large, black, with silvery bloom ; third less than twice the length of second, ferruginous, with silvery bloom. Vibrissa inserted close to oral margin ; four small facial bristles ; seven or eight epistomials. A row of nine frontals present. Verticals moderately large, lateral verticals inconspicuous. Three rows of black bristles behind eyes ; genæ with short golden hairs posteriorly, longer below, but never forming a beard-like growth.

Thorax greyish gold above, brighter gold on sides, grey beneath. Dorsal surface with the three usual longitudinal stripes of which the middle one alone extends on to scutellum. Anterior spiracle dark chocolate, well provided with yellowish silvery hairs. Of the acrostichals only the prescutellar pair present. The row of dorsocentrals is complete, the posterior pair extending well beyond the scutellum. Anterior intraalar very weak. Upper humeral very weak. Scutellar apicals small. Halteres brown.

Legs black and grey. First femur very faintly tinged with gold ; longitudinal rows of bristles complete ; not hairy ; tibia a little longer than tarsus. Second femur not hairy ; a "comb" of eight bristles differentiated ; second tibia hairless, and much longer than tarsus. Third femur very faintly hairy ; tibia a little longer than tarsus, hairless.

Abdomen somewhat shorter than thorax, with the usual black and silvery markings, the silvery predominating. The median longitudinal stripe does not extend on to the last segment. Hypopygium not visible from above ; very dark shining brown, almost black, and provided with rather short black hairs. Forceps slightly curved, sharply pointed, shiny black, hairy ; posterior two-thirds bare. Claspers dark shiny black. The penis is a very complex organ ; first joint shiny black ; the second very strongly chitinised and provided with several complex white or brown chitin pieces (Fig. 4).

FEMALE.—This closely resembles the male in general appearance and body proportions. Frons a little broader than width of eye. Frontal stripe about the width of parafrontals. Outer row of three frontal bristles well developed. Thoracic

chaetotaxy as in male except that the apieal scutellars are absent. The second femur does not develop a "comb." Posterior trochanter with apical bristle. Abdomen a little more rounded than in male; the dorsal longitudinal line extends on to last segment.

Our specimens were bred from bad meat in Brisbane in November 1920.

Mr. W. W. Froggatt kindly allowed us to examine a female fly from the Brisbane district, determined for him by Coquillet as *S. aurifrons* Macquart. This female could be identified specifically with others which we have bred (along with the males) from bad meat. As these flies did not differ in any way from the scanty description given by Macquart, we have accepted them as belonging to this species, hoping, by giving an account of the male copulatory organs, to remove the confusion which appears to prevail regarding this fly. Macquart's account could cover several species, and an examination of his type, if in existence, would be necessary to settle which, if any, of the many related forms herein described actually represents his species. Failing that, the above account will stand as valid for the species.

This fly is generally regarded as one of the sheep maggot-flies of N.S.W. and Queensland (Tryon 1917, p. 53). Macquart mentioned as localities "New Holland" and Tasmania. It is not very common about Brisbane. Mr. W. W. Froggatt has given a coloured figure and a short account (1905; 1907; 1915, p. 29, fig. 4). Mackinnon (1920, p. 553) has also published a figure.

In 1858, Doleschall described a different fly from Amboina as *S. aurifrons* n. sp., but as the specific name was already preoccupied his species might be renamed *S. doleschalli*.

13. *Sarcophaga froggatti* Taylor 1917 (Fig. 12).

Syns. : *S. knabi* Parker 1917.

S. aurifrons (in part) of Australian authors.

General appearance grey and golden. A medium-sized fly, varying from 6 to 11 mm. in length.

MALE.—*Head*.—Front a little less than half the width of eyes. Parafrontals bright golden. Mesofacial plates pale golden, borders faintly tinged with brown. Cheeks and genæ

golden. Frontal stripe ferruginous, with a faint silvery brown. First antennal segment short and black; second much larger, black, with a ferruginous tinge, and silvery bloom; third joint about twice the length of the second. Arista dark brown at base, remainder light brown; strongly plumose for over half its length. Eyes reddish brown. Epistome prominent and silvery. A single row of black bristles behind eyes; bristles behind these weak and golden, becoming very long below. Cheeks provided with short golden hairs. A row of nine frontal bristles present. Lateral verticals present, but not very large. Four very weak facial bristles, also eight somewhat larger epistomials.

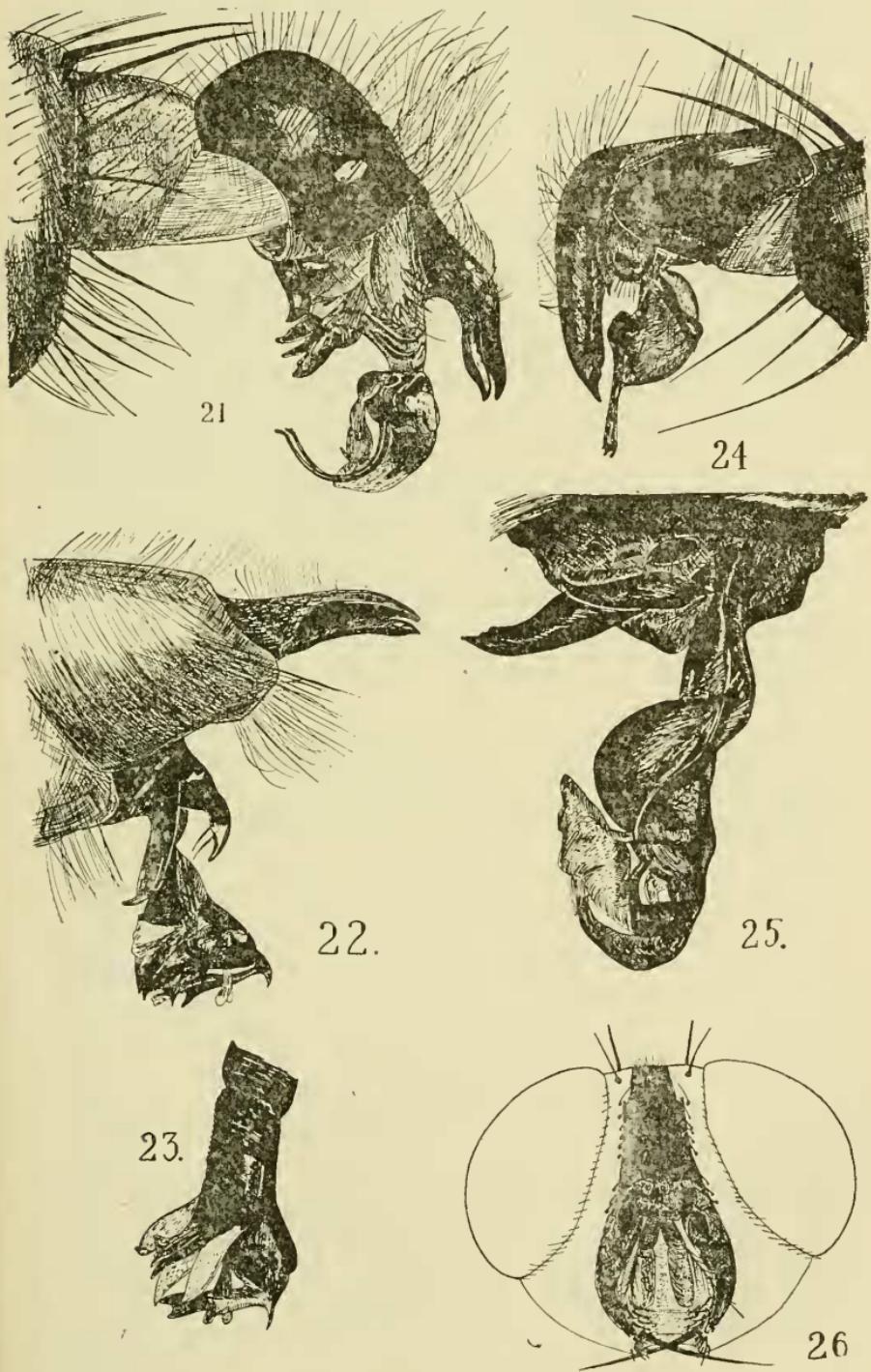
Thorax somewhat ashy coloured above, tinged with gold. Longitudinal stripes irregular, the middle one alone extending on to the scutellum. Ventral side of thorax greyish, with golden areas. Anterior spiracle brown, clothed with golden hairs.

Of the acrostichals only the prescutellar pair present. Anterior dorsocentrals weak, first posterior weak, second weak, third considerably larger, fourth very large. Three humerals present, of which the lowest is very large, extending beyond the pronotum. Scutellar apicals very large. Anterior intraalar bristle as large as first anterior dorsocentral.

Legs dark grey, tinged with silver. Inner side of coxae grey, armed with long reclinate bristles, outer side dark, ferruginous. First femur hairy on ventral side, but not markedly so. Second femur a little hairy proximally, midventral row of bristles developed into a "comb." Third femur strongly hairy. Third tibia very hairy. Pulvilli brown.

Abdomen silvery with ordinary dark-grey markings, provided above with short reclinate bristles, below with long hairs. Hypopygium very dark brown, almost black, very hairy. Forceps brown above, black below, hairy, tips bare; connecting membrane poorly developed. Accessory plates dark brown, provided with long thin hairs. Claspers shiny black.

The penis is of the *tuberosa* type; the chitinisation being not markedly heavy, so that the greater part of the organ is brown, not black. It is somewhat triangular in shape, the posterior ventral corner giving off a very short blunt process,



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from which a pair of yellowish "scythe-like" processes run forwards and meet. Immediately above this there is a complicated but rather weak mass of chitinised tissue (Fig. 12).'

FEMALE.—The female differs from the male in the following characters :—Front equal to width of eyes. Lateral ventral bristles almost as large as verticals. Eight frontal bristles beside frontal stripe; three others converging upon these beside the eye. Lowest humeral bristle does not extend to mesonotum. Femora not markedly hairy; no "comb" developed on second femur; posterior tibia hairless. Abdomen a little shorter but broader than thorax; oval in shape, and with the usual black and grey markings.

A male of this fly was submitted to Dr. Aldrich, who determined it, by an examination of the male genitalia, as *S. knabi* Parker 1917. Mr. G. F. Hill of the Tropical Institute, Townsville, kindly sent us some specimens which he found to be co-specific with Taylor's type in the Institute Collection. A comparison of the male genitalia of these forms, with the specimen which Dr. Aldrich determined as *S. knabi*, shows the two to be specifically identical, and to agree entirely, also, with *S. knabi* as described by Parker. *S. froggatti* Taylor and *S. knabi* Parker are therefore synonymous, the former having a few months' priority. Townsend (1917, p. 191) created a genus *Glaucosarcophaga* with *S. knabi* as type. If the genus be accepted then the correct name of the type is *G. froggatti*.

This fly has a very wide range. Taylor's material came from Winton (Central Queensland); our own is from Brisbane; Dr. Parker's specimens were collected in the Philippine Islands.

14. *Sarcophaga zeta* n. sp. (Fig. 20).

General appearance closely resembling *S. aurifrons* Macq.
Length 12 mm.

MALE.—*Head*.—Front not very prominent; at its narrowest about two-fifths the eye-width. Frontal stripe very dark brown, almost black, equal in width to the parafrontals. The latter bright gold, with dark reflections; genæ a little paler golden. Eyes dark red-brown. Mesofacial plates bright golden, borders very faintly tinged with black; back of head golden. Epistome prominent, pinkish. First antennal joint

inconspicuous; second much larger, nearly black; third ferruginous, with silvery bloom, and thrice the length of second. A row of fourteen frontal bristles present; seven facials; nine epistomials. Proboscis black, with golden hairs; palps almost black. A single row of black bristles behind eyes; hairs on back of head golden; hairs on genæ pale gold, and moderately long. Verticals present, but not very large; lateral verticals absent.

Thorax pale golden, with three longitudinal black stripes of which the middle one extends as a faint indication on the scutellum. Scutellum distinctly grey. Sides of thorax pale gold and silvery; ventral side grey. Last pair of anterior acrostichals present; prescutellar acrostichals well developed. Dorsocentral row complete, the last two larger than others; three humerals well developed, the lowest not extending to mesonotum. Anterior intra-alar slightly larger than usual. Scutellar apicals well developed.

Legs black and grey. First femur golden on ventral side; longitudinal row of bristles complete; femur moderately hairy. Second femur with a well-developed "comb," only very slightly hairy; second tibia not hairy. Third femur only faintly golden on under side, and lightly clothed with short hairs.

Abdomen silvery and black, as usual; very hairy on ventral surface. Hypopygium very dark brown almost black, less hairy than usual. Forceps, when viewed externally, shiny black, slightly sculptured and angular, but when viewed internally they appear dark brown. They are closely approximated for over half their length, but no connecting membrane is developed. At the angle are about ten short, stout, black bristles. The upper portion is hairy. Accessory plates brown and provided with only short hairs. Claspers brown at base, shiny black towards tips. Posterior clasper long and blunt; the anterior bifurcate. The connecting membrane immediately surrounding the penis develops a small "clasper-like" process antero-ventrally. First joint of penis dark brown; the second joint considerably simpler in structure than in the other forms examined by us, almost black in colour, and provided distally with a pair of medium-sized recurved hooks (Fig. 20).

Described from one male captured on bad meat in Brisbane.

15. *Sarcophaga theta* n. sp. (Fig. 5).

General appearance very like *S. aurifrons*. Length 9 to 12 mm.

MALE.—*Head*.—Front fairly prominent, about half the width of eye. Frontal stripe nearly black, a little wider than parafrontals. Parafrontals, genæ, and back of head bright golden; mesofacial plates silvery with golden tinge and darker borders. Epistome fairly prominent, tinged with pink. First antennal segment very small; second shorter than usual and nearly black; third well over thrice the length of second, and of a very dark brown colour. Eyes red-brown. Proboscis and palps as usual. Eleven frontals beside frontal stripe; vibrissæ rather shorter than usual. Five facials, seven peristomials. Verticals present, lateral verticals absent. A single row of short black bristles behind eyes; back of head clothed with short pale-golden hairs, developing into a beard-like growth on the lower part of the genæ, but rather sparse and short on the anterior portion of the latter.

Thorax a pale-golden colour, with the usual three longitudinal black stripes, the middle one plainly visible on the scutellum, the lateral two only very faintly so. Sides of thorax golden; under side grey. Anterior spiracle provided with yellow hairs.

Of the anterior acrostichals only the posterior pair present, though but very weak; posterior acrostichals entirely absent. Dorsocentral row complete, the last pair extending just to the tip of scutellum. Two intra-alars, also apical scutellars, present.

Legs black and grey. First femur golden below and lightly hairy proximo-ventrally; tibia longer than tarsus. Second femur not hairy; a “comb” not definitely differentiated; tibia hairless. Third femur hairless, tibia strongly hairy.

Abdomen with the usual black and grey markings. The median longitudinal black row prominent anteriorly; extending only faintly on to the last segment. Abdomen with short black reclinate bristles above, hairy beneath. First segment of hypopygium silvery pollinose; second nearly black, shiny and very hairy. Forceps shiny black, a little sculptured, approximated posteriorly for about three-fifths their length; straight almost to the tips which are fairly sharply bent,

pointed and bare; the remainder strongly hairy. Accessory plates very large, dark brown and hairy. Claspers shiny black. First segment of penis brown; second more heavily chitinised, black, in parts brown, the outer portions yellowish or whitish. It is a relatively simple organ with a pair of short forwardly directed ventral processes, and a large irregular chitinous mass above and anterior to these (Fig. 5).

FEMALE.—This differs from the male in the following characters:—Front about as wide as eyes. Lateral verticals well developed. A row of eight frontals beside frontal stripe, and three larger ones beside eye. Scutellum slightly more abbreviated than in male. Thoracic chaetotaxy as in male, except that the apical scutellars are absent. Thorax moderately hairy beneath. First leg not hairy; the second femur is remarkable in that it has a well-developed “comb” of eight bristles, such a structure being here confined to the female, whereas normally it occurs only in the male. Third tibia not hairy. Abdomen a little more rounded than in male. Dorsal longitudinal line extends definitely on to last segment.

Described from a number of males and females bred from decaying meat in Brisbane in September 1920.

16. *Sarcophaga iota* n. sp. (Fig. 11).

In general appearance a medium-sized greyish-gold fly; length of the male about 12 mm., while the female is usually from 9 to 10 mm.

MALE.—*Head.*—Front prominent; over half the eye-width. Frontal stripe nearly black, and slightly less than width of parafrontals. Parafrontals golden, almost brassy in colour; genæ approximately the same colour as parafrontals. Mesofacial plate silvery, with dark borders. First antennal joint inconspicuous; second moderately large, black; third black, and about four times the length of second. Back of head golden. Proboscis dark brown, almost black, and provided with long dark-brown hairs; palps very dark brown; epistome very faintly pink, not prominent. A single row of black bristles behind eyes; hairs below these golden, short, developing into a beard-like growth ventrally; anterior part of genæ with shorter golden hairs. Verticals present; lateral verticals absent. A row of frontals beside frontal stripe. Vibrissæ not very large.

Thorax greyish gold, with the usual black longitudinal stripes, the middle one alone extending on to scutellum ; sides of thorax grey and gold ; ventral side grey. Anterior spiracle dark chocolate brown, provided with brown hairs. Of the anterior acrostichals only the last two pairs are present ; of the posterior, only the prescutellar, which are very strong, reaching nearly to the tip of scutellum. Apical scutellars present. Three intra-alar bristles present. Posterior pair of dorsocentrals reach far beyond scutellum.

Legs black and grey. First femur golden below, clothed with short hairs, tibia a little longer than tarsus. Second femur not hairy ; a "comb" differentiated ; tibia a little longer than tarsus. Third femur lightly hairy ; tibia longer than tarsus and not markedly hairy.

Abdomen with the usual black and white markings ; with short reclinate bristles dorsally, and a long beard-like growth of hairs ventrally. In the hypopygium the first segment is silvery pollinose, the second almost black and provided with long hairs. Forceps approximated for about two-thirds their length ; angular in side view, ending in a sharp point ; tip black and bare ; upper portion slightly hairy, and dark shiny brown. Accessory plate brown, rounded, and moderately hairy. Claspers very dark brown. First joint of penis brown ; second more heavily chitinised, black and dark brown, provided ventrally with a pair of hook-shaped, foliaceous processes, tipped ventrally with white (Fig. 11).

FEMALE.—This differs from the male in the following characters :—It is shorter than the male, measuring about 9 to 10 mm. ; one female reached only 7 mm. Front as wide as eyes. Lateral verticals very well developed. A row of seven frontal bristles beside the frontal stripe, and three large bristles beside eye. Scutellum much abbreviated, almost flat, whereas in the male it is strongly convex. Thoracic chaetotaxy as in male ; i.e. two anterior acrostichals, three intra-alars, but no apical scutellars. Tibiae and femora all hairless. No "comb" on second femur. Abdomen very rounded ; hairy, but not markedly so beneath ; median dorsal black line extends on to last segment.

Bred from decomposing meat in Brisbane, October 1920.

17. *Sarcophaga kappa* n. sp. (Fig. 7).

General appearance like *S. aurifrons* Mcq. Length 12 mm.

MALE.—*Head*.—Front not prominent; about two-fifths the width of eye. Eyes dark red-brown; frontal stripe very dark chocolate brown, and slightly broader than parafrontals at their narrowest. Parafrontals, genæ, and back of head golden, the latter very faintly tinged with dark. Genæ distinctly paler than parafrontals. Proboscis nearly black with brown hairs; palps very dark brown. Mesofacial plates faintly golden, more greyish at sides; epistome pinkish, not very prominent. First antennal joint inconspicuous; second black, tinged with silver, and a little smaller than usual; third joint rather over four times the length of second, and of a beautiful fawn colour. A row of twelve frontal bristles present. Verticals large; lateral verticals absent. Seven facials and eleven peristomials. A single row of black cilia behind eyes; hairs below these short and golden, developed into a beard-like growth below; hairs on anterior part of cheek shorter and golden.

Thorax pale golden, with the usual three regular longitudinal black stripes, the middle one extending on to the scutellum, the laterals represented each by a pale-brown discolouration. Sides golden; ventral portion grey. Of the anterior acrostichals only the posterior pair is developed; of the posterior set only the prescutellars, and these are considerably weaker than the anterior intra-alar. Scutellar apicals present; also three humerals, the lowest not reaching to the mesonotum. Dorsocentral row normal, the last pair (prescutellar) reaching just beyond scutellum.

Legs black, femora tinged with grey. First femur hairy, tibia slightly longer than tarsus. Second femur hairy proximo-ventrally, a "comb" developed distally; tibia longer than tarsus and not hairy. Posterior femur and tibia hairy.

Abdomen as long as thorax, conical, with the usual black and white markings, the median black line extending on to last segment; hairy below. First genital segment grey and pollinose; second dark brown, almost black, hairy. Accessory plates dark brown with long hairs. Forceps shiny black, curved; tips bare, remainder hairy, especially proximally. Claspers very dark brown, and articulating with one another basally. First joint of penis dark brown; the greater part

of the second black, with parts a lighter brown and parts whitish. From the ventral side are given off a number of irregularly shaped, somewhat foliaceous processes fringed with short whitish hairs. The penis is provided laterally with two strong black hooks, closely resembling claspers (Fig. 7).

FEMALE.—This differs from the male in the following important characters :—Front about four-fifths the width of eyes ; parafrontals nearly twice the width of frontal stripe. Lateral verticals very well developed. Nine frontal bristles beside the frontal stripe ; three which are much larger beside the eye. Thoracic chætotaxy as in male, except that the prescutellar acrostichals are slightly larger in the female, and the scutellar apicals absent. First femur not hairy. Second and third tarsi and tibiæ without hair. Abdomen more rounded than in male, and with the usual markings, the median black line extending on to the last segment.

Described from several males and females bred from bad meat in Brisbane.

18. *Sarcophaga omikron* n. sp. (Fig. 16).

General appearance closely resembling *S. aurifrons*. Length 10 to 12 mm.

MALE.—*Head*.—Front moderately prominent, a little less than half the width of eye ; eyes brown. Frontal stripe black, a little narrower than parafrontals. Parafrontals, genæ, and occiput bright golden ; mesofacial plates silvery, faintly tinged with gold. Epistome inconspicuous ; first antennal joint invisible ; second large, black, coated with silvery hairs ; third joint silvery, about thrice the length of second. Arista shorter than usual, measuring only about six-fifths the length of the antennal joints combined. A row of twelve frontals beside frontal stripe ; at the upper end of this row, below the ocelli, are five other bristles, one outside the row, the others internal to it. Vibrissa inserted fairly close to oral margin. About twelve facials and eight peristomials present. Verticals not very strongly developed ; a single row of short black bristles behind eyes ; occiput covered by short golden hairs which become longer below on the genæ, but shorter again more anteriorly.

Thorax rather bright golden, with the longitudinal jet-black stripes much darker than usual ; the middle one alone has a

very prominent extension on to the scutellum. Sides grey and gold; ventral side grey; both provided with patches of long golden hairs. Shoulders with short black bristles and long golden hairs. Anterior spiracle dark chocolate, and provided with a heavy coat of short brown hairs.

Of the anterior acrostichals, only the posterior pair present, rather long but slender; of the posterior set, only the prescutellars. Scutellar apicals present; dorsocentral row complete, the last pair very long, the second shorter, but much stronger than those anterior to them. Two intra-alars.

Legs grey and black. The first femur bright golden beneath, and clothed with short hairs; longitudinal rows of bristles very complete. Second femur hairy proximo-ventrally; distally a "comb" is differentiated; tibia hairless, and considerably longer than tarsus. Third femur heavily clad with short hairs; distal two-thirds of tibia very hairy; distal third free; tibia longer than tarsus.

Abdomen about as long as thorax; conical, with the usual black and white markings; the dorsal longitudinal black line extends faintly on to last segment. Covered dorsally with short black reclinate bristles; hairy beneath. Hypopygium visible dorsally; first segment silvery pollinose, second shiny black and hairy. Forceps shiny black, curved, sharply pointed; tips bare, rest hairy. Accessory plates brown, hairy. Claspers simple; shiny black. The penis is a very stout organ, brown in colour, slightly pollinose, and developed distally into a short stout hook, as figured (Fig. 16).

FEMALE.—This differs from the male in the following characters:—Frontal stripe about four-fifths the width of eye. A row of nine frontal bristles beside frontal stripe, a second row of three large bristles immediately beside the eye. Lateral verticals prominent. Thoracic chaetotaxy as in male, except that the scutellar apicals are absent. Scutellum considerably more rounded than in male. First femur only slightly golden, not hairy; tibia about as long as tarsus. Second and third tibiæ and femora hairless; no "comb" on second femur. Abdomen rounded, much shorter than thorax; covered dorsally with short reclinate bristles; longitudinal black line faintly visible on last segment. Ventral side scarcely hairy.

Described from specimens bred from wool by Mr. Henry

Tryon, Queensland Government Entomologist, as well as one bred by Miss M. J. Bancroft from rotten potato in Eidsvold in March 1920.

19. *Sarcophaga sigma* n. sp. (Fig. 17).

General appearance closely resembling *S. aurifrons*.

MALE.—*Head*.—Eyes dark red-brown, and very flat in front, giving the front a very prominent appearance. Parafrontals gold with dark reflections. Front half as wide as eyes; frontal stripe nearly black, a little wider than parafrontals. Genæ golden with a rather brassy tint. Occiput golden. Mesofacials silvery; epistome fairly prominent. First antennal segment not very conspicuous; second large, nearly black; third about twice length of second, nearly black. A row of twelve frontals beside frontal stripe. Verticals present; lateral verticals rather well developed. Eight peristomials and seven facials present. Three rows of short black bristles behind eyes; the first row much more regular and complete than the others. Hairs below these short and silvery, developing into a beard-like growth below. Anterior part of genæ with black bristles.

Thorax golden grey with the usual black longitudinal stripes, only the middle one extending prominently on to the scutellum. Sides grey, tinged with golden, under side grey; anterior spiracle with brown hairs. Of the acrostichals only the prescutellar pair present, though very weakly developed; three intra-alars; dorsocentral row complete; apical scutellars present; lowest humeral very large, extending just on to the mesonotum.

Legs black and grey. First femur tinged with gold ventrally, not hairy; tibia longer than tarsus. Second femur with a “comb,” hairy proximo-ventrally. Third femur only slightly hairy; tibia not hairy.

Abdomen conical, shorter than thorax, with the usual black and white markings. Dorsal median line wide, but irregular, not extending on to last segment. Covered dorsally with short black reclinate bristles; hairy ventrally. Last segment of hypopygium shiny black, hairy; forceps fairly straight, bare at tips, hairy above. Accessory plate dark brown, hairy. Claspers dark shiny black. The penis is a heavily chitinised structure; the last segment nearly black, and divided distally into two parts, as figured (Fig. 17). The

posterior portion bears a long thin bent chitinous process ; while laterally there is a curious tube-like structure of a pale-brown colour.

FEMALE.—This differs from the male in the following characters :—Front about four-fifths the eye-width. A row of eight frontals beside the frontal stripe, and three large bristles beside the eye ; lateral verticals well developed. Three rows of black bristles behind eyes ; the first row well developed ; the second irregular ; the third very incomplete. Thoracic chaetotaxy as in male, except that the apical scutellars are absent. Legs as in male except that the second femur is not hairy and no "comb" develops ; third femur not hairy. Abdomen more rounded than in male ; very slightly hairy beneath, and then only posteriorly.

Described from a number of males and females bred from decaying meat in Brisbane in December 1920.

20. *Sarcophaga bancrofti* n. sp. (Fig. 8).

In general appearance a rather small form, measuring about 7 mm. in length.

MALE.—*Head*.—Front prominent ; less than one-third the width of eye. Eye reddish yellow. Frontal stripe very dark chocolate, wide below, but narrowing off towards the ocelli. Parafrontals pale golden above and beside the frontal stripe, the remainder silvery and heavily pollinose. Mesofacial plates a beautiful dark ferruginous colour ; genæ and metacephalon bright golden. The three antennal joints of a brilliant ochre ; first joint clearly visible ; second usual size ; third over twice the length of second. Arista plumose for well over half its length, and not very much longer than the three antennal joints combined. Vibrissæ inserted close to oral margin. Six facials, eight peristomial, and a row of ten frontals present. Verticals not very strongly developed. Two rows of black bristles behind eyes ; the lower row rather incomplete. Back of head coated with silvery hairs, which become longer below, but do not develop into a beard-like growth. Cheeks coated with black bristles. Proboscis as usual ; palps like antennæ.

Thorax golden with the usual longitudinal black stripes, which do not extend on to scutellum. Lateral and ventral

parts grey. Anterior spiracle very small, clad with hairs which have a pinky tinge. Of the anterior acrostichals, only the posterior pair present; of the posterior acrostichals only the prescutellar occur and are rather well developed. Scutellar apicals present. Dorsocentral row complete. Four humeral bristles; anterior post-humeral does not reach beyond pronotum; second post-humeral a little smaller than first.

Legs black and grey. First femur not hairy, tarsus somewhat longer than tibia. Second femur not hairy, "comb" not clearly differentiated; tibia not hairy, longer than tarsus. Last leg not hairy. Pulvilli dark brown, fringed with silver.

Abdomen long and conical; the large anterior segment with a median triangular black patch; grey laterally, bordered with black; other segments with an indefinite black line along the back, dark brown beside this, bordered with a pair of anterior white and posterior black patches in each segment. Covered dorsally with short reclinate bristles; not hairy below, but clothed with short weak bristles.

First segment of hypopygium black, with faint silvery bloom; second segment black, very faintly ridged, and very slightly hairy. Forceps black; lightly hairy; rather thin and weak; not sharply pointed. Accessory plate somewhat triangular, hairy. Claspers dark shiny black, simple, the anterior pair larger than the posterior. The penis is a heavily chitinised structure; first joint shiny black, white ventrally; second joint nearly square in side view, provided anteriorly with a stout rather sharp hook, and posteriorly with a pair of yellowish brown processes (Fig. 8).

Described from a male caught in open forest country in Queensland National Park, in January 1921. The species is dedicated to Dr. T. L. Bancroft and his daughter M. J. Bancroft, Eidsvold, who have assisted us so freely in regard to material.

**21. *Sarcophaga* (*Parasarcophaga*) *omega* new subgen.,
n. sp. (Figs. 25, 26).**

MALE.—Head (Fig. 26).—Front exceedingly prominent. Frontal stripe about thrice the width of the parafrontals, and pitchy black in colour, a little folded, and very minutely punctate. In the region of the ocelli it narrows; but below it widens out, developing into a pair of prominent folded excres-

ences, which protrude well in front of the antennæ, surround the mesofacial plate, and gradually die out at the oral margin. Front slightly under three-fifths the width of eye ; genæ, metacephalon, and parafrontals brightly golden pollinose. First antennal joint concealed ; second rather large, pitchy black, slightly punctate, with a few small bristles ; third joint black, with a very faint silvery bloom, and about two and a half times the length of second. Mesofacial plate golden, with darker borders. Cheek height about two-fifths that of eye. Eye rather small, dark red-brown. A single row of ten rather small frontal bristles present ; verticals large ; lateral verticals absent. A single row of black bristles behind eyes ; metacephalon covered with short pale-golden hairs, growing much longer below on the genæ ; anterior part of genæ lightly clothed with pale-golden hairs. Proboscis and palps as usual.

Thorax at its broadest about the width of the head ; colour rather ashy, faintly golden, with the usual three very dark brown longitudinal stripes, the middle one alone extending on to scutellum. Anterior spiracle large and clothed with pale-golden hairs. Sides grey and golden ; under side grey and golden, the former predominating. Of the anterior acrostichals only the posterior pair is well developed ; of the posterior set, only the prescutellars are differentiated, being rather large. Dorsocentral row normal ; apical scutellars well developed ; two intra-alars present. Three humerals, the lowest extending just beyond pronotum ; a single post-humeral.

Legs black and grey. First femur golden beneath ; longitudinal rows of bristles complete ; femur only very slightly hairy proximo-ventrally ; tibia not hairy. Second femur clothed with short hairs proximo-ventrally ; a well-defined "comb" present ; tibia longer than tarsus. Last femur heavily clothed with short hairs ; distal two-thirds of tibia hairy ; tibia longer than tarsus.

Abdomen conical and rather longer than thorax, with the usual black and white markings, the longitudinal black line not extending on to last segment. Upper surface with short reclinate bristles ; lower surface moderately hairy.

First segment of hypopygium black, faintly golden pollinose, hairy ; second segment rather small, shiny black, very hairy. Forceps shiny black or very dark brown, faintly sculptured, sharply pointed, hairy ; upper half approximated,

points converging towards each other. A moderately developed connecting membrane present. Accessory plate brown, hairy. First joint of penis dark brown; second somewhat like that of *Sarcophaga froggatti*, though more elongated.

Described from one male, caught on decaying meat in Brisbane, April 1921.

This species is distinguished from all other Sarcophagids known to us by the above-mentioned very prominent excrescences on the head. As all the remaining external characters are of the ordinary *Sarcophaga* type, we are placing this form in a new subgenus *Parasarcophaga* which may be provisionally diagnosed as follows:—*Male*: General characters as in *Sarcophaga*; but frontal stripe about three times the width of the parafrontals whereas in the males of *Sarcophaga* it is seldom more than twice; frontal stripe developed into a very large lobed prominence forming an arch around the mesofacial plate. Type species, *Parasarcophaga omega*.

LIST OF FIGURES.

With the exception of No. 26, all figures are freehand drawings of male copulatory organs:—1, 2, two different ventral views of *S. irrequieta*; 3, lateral view of same; 4, *S. aurifrons*; 5, *S. theta*; 6, *S. beta*; 7, *S. kappa*; 8, *S. bancrofti*; 9, 10, *S. tryoni*; 11, *S. iota*; 12, *S. froggatti*; 13, *S. delta*, penis only; 14, *S. eta*; 15, *S. gamma*; 16, *S. omikron*; 17, *S. sigma*; 18, *S. impatiens*; 19, *S. impatiens*, penis only; 20, *S. zeta*; 21, *S. alpha*; 22, *S. misera*; 23, *S. dux*; 24, *Helicobia australis*; 25, *S. (Parasarcophaga) omega*, penis only; 26, *S. (P.) omega*, front view of head.

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